



## Description

The HXY5N10AI uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 100V$   $I_D = 5A$

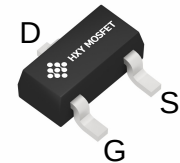
$R_{DS(ON)} < 125m\Omega$  @  $V_{GS}=10V$

## Application

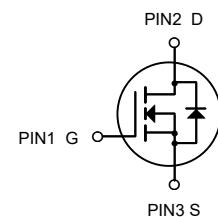
Battery protection

Load switch

Uninterruptible power supply



SOT-23



N-Channel MOSFET

## Ordering Information

| Product ID | Pack   | Marking | Qty(PCS) |
|------------|--------|---------|----------|
| HXY5N10AI  | SOT-23 | MA6     | 3000     |

## Absolute Maximum Ratings ( $T_C=25^{\circ}C$ unless otherwise noted)

| Symbol                  | Parameter                                                      | Rating     | Units         |
|-------------------------|----------------------------------------------------------------|------------|---------------|
| $V_{DS}$                | Drain-Source Voltage                                           | 100        | V             |
| $V_{GS}$                | Gate-Source Voltage                                            | $\pm 20$   | V             |
| $I_D @ T_A=25^{\circ}C$ | Continuous Drain Current, $V_{GS} @ 10V^1$                     | 5          | A             |
| $I_D @ T_A=70^{\circ}C$ | Continuous Drain Current, $V_{GS} @ 10V^1$                     | 3.2        | A             |
| $I_{DM}$                | Pulsed Drain Current <sup>2</sup>                              | 16         | A             |
| $P_D @ T_A=25^{\circ}C$ | Total Power Dissipation <sup>3</sup>                           | 3.1        | W             |
| $T_{STG}$               | Storage Temperature Range                                      | -55 to 150 | $^{\circ}C$   |
| $T_J$                   | Operating Junction Temperature Range                           | -55 to 150 | $^{\circ}C$   |
| $R_{\theta JA}$         | Thermal Resistance Junction-ambient(steady state) <sup>1</sup> | 100        | $^{\circ}C/W$ |
| $R_{\theta JA}$         | Thermal Resistance Junction-ambient( $t < 10s$ ) <sup>1</sup>  | 40         | $^{\circ}C/W$ |



**Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise noted)**

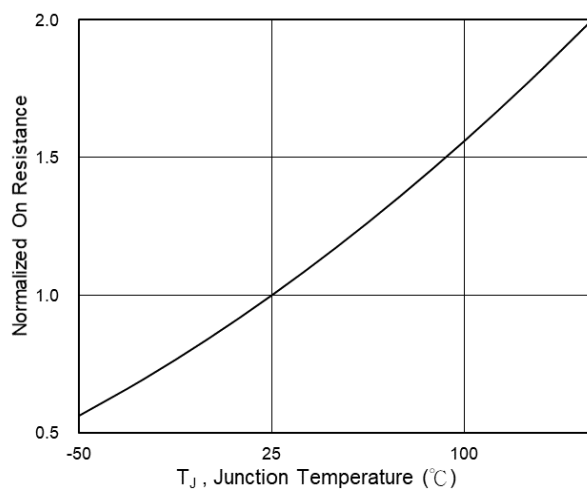
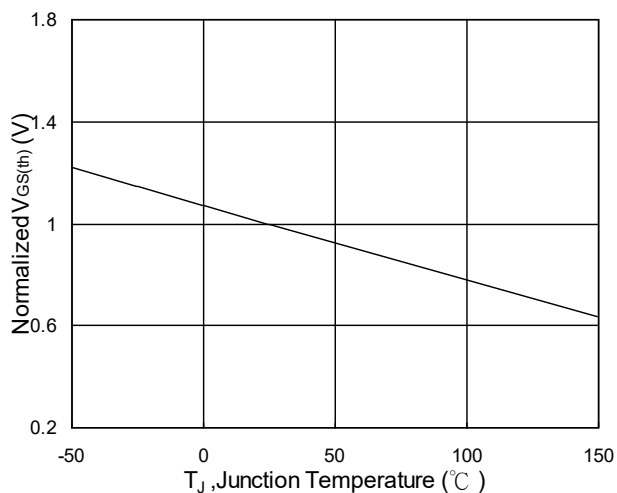
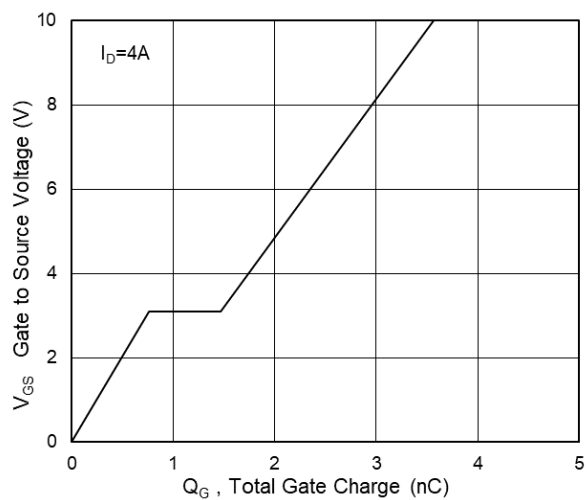
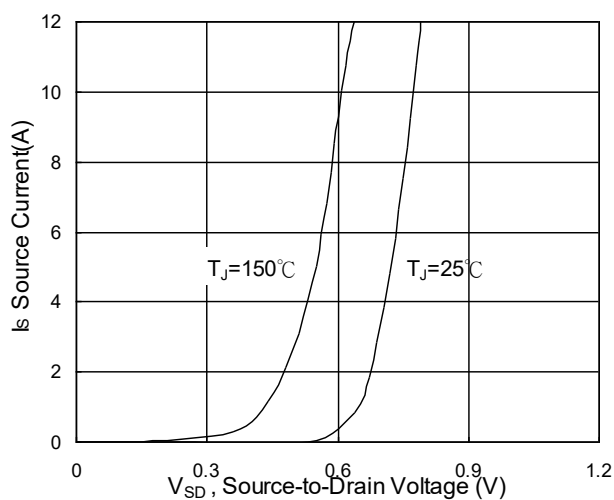
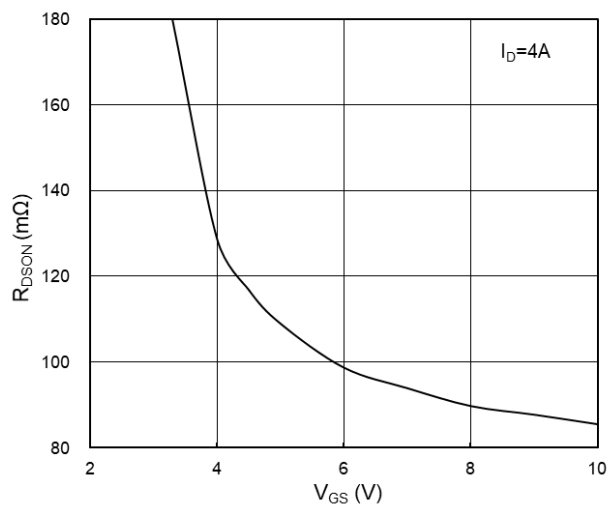
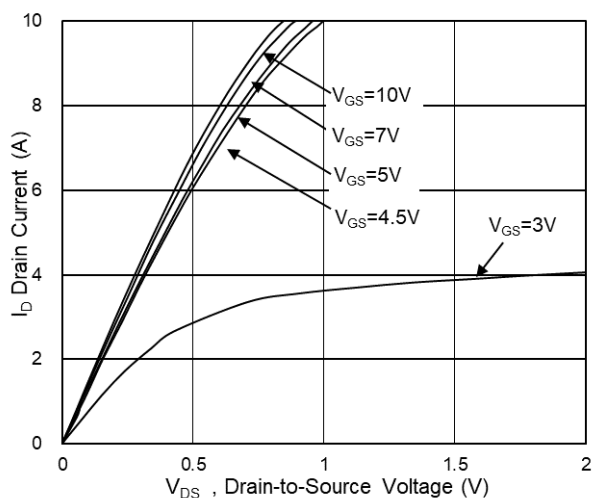
| Symbol       | Parameter                                      | Conditions                                             | Min. | Typ. | Max.      | Unit      |
|--------------|------------------------------------------------|--------------------------------------------------------|------|------|-----------|-----------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=250\mu A$                           | 100  | 108  | ---       | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V$ , $I_D=4A$                                | ---  | 110  | 125       | $m\Omega$ |
|              |                                                | $V_{GS}=4.5V$ , $I_D=2A$                               | ---  | 120  | 145       | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                       | 1.2  | 1.7  | 2.5       | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=80V$ , $V_{GS}=0V$ , $T_J=25^{\circ}\text{C}$  | ---  | ---  | 1         | $\mu A$   |
|              |                                                | $V_{DS}=80V$ , $V_{GS}=0V$ , $T_J=85^{\circ}\text{C}$  | ---  | ---  | 50        |           |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                         | ---  | ---  | $\pm 100$ | nA        |
| $R_g$        | Gate Resistance                                | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1\text{MHz}$            | ---  | 2.3  | 4.6       |           |
| $Q_g$        | Total Gate Charge (10V)                        | $V_{DS}=30V$ , $V_{GS}=10V$ , $I_D=4A$                 | ---  | 3.57 | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                        | ---  | 0.76 | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                        | ---  | 0.71 | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=30V$ , $V_{GS}=10V$ ,<br>$R_G=3.3$<br>$I_D=1A$ | ---  | 11   | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                        | ---  | 6    | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                        | ---  | 30   | ---       |           |
| $T_f$        | Fall Time                                      |                                                        | ---  | 4    | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=50V$ , $V_{GS}=0V$ , $f=1\text{MHz}$           | ---  | 182  | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                        | ---  | 30   | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                        | ---  | 3.6  | ---       |           |
| $I_S$        | Continuous Source Current <sup>1,4</sup>       | $V_G=V_D=0V$ , Force Current                           | ---  | ---  | 2         | A         |
| $V_{SD}$     | Diode Forward Voltage <sup>2</sup>             | $V_{GS}=0V$ , $I_S=1A$ , $T_J=25^{\circ}\text{C}$      | ---  | ---  | 1.2       | V         |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The power dissipation is limited by  $150^{\circ}\text{C}$  junction temperature
- 4.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.



## Typical Characteristics



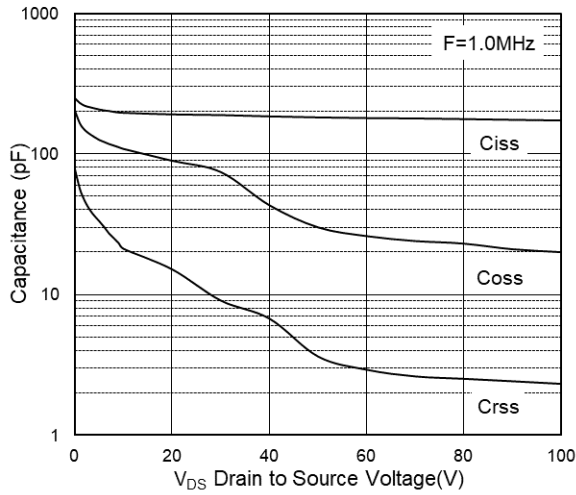


Fig.7 Capacitance

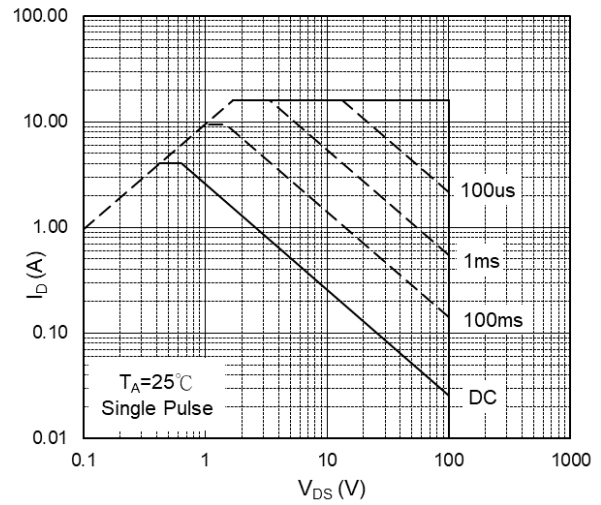


Fig.8 Safe Operating Area

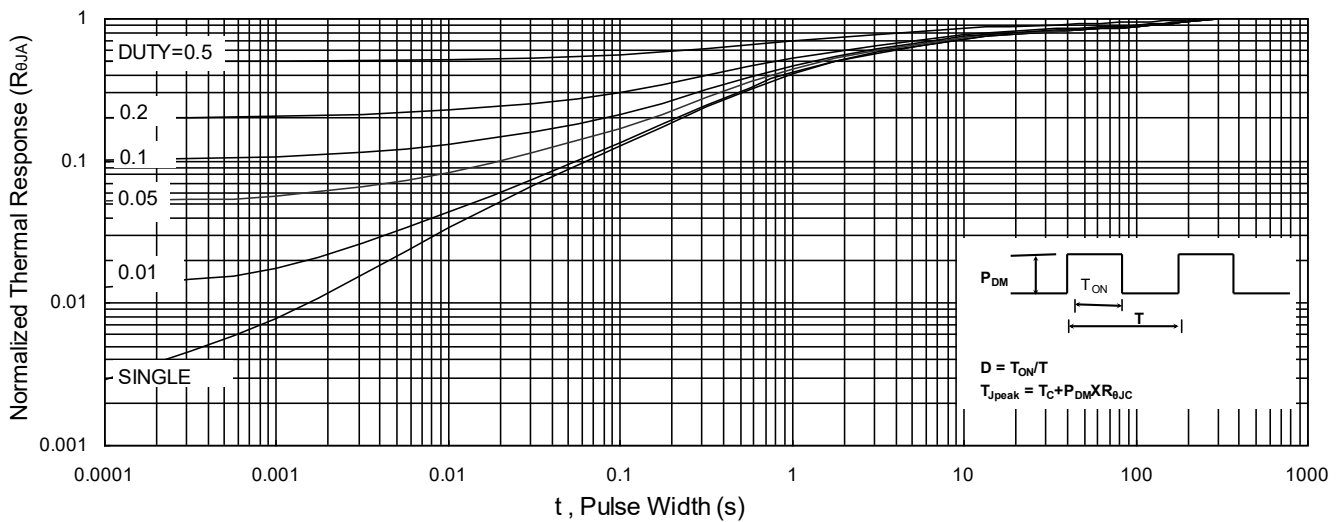


Fig.9 Normalized Maximum Transient Thermal Impedance

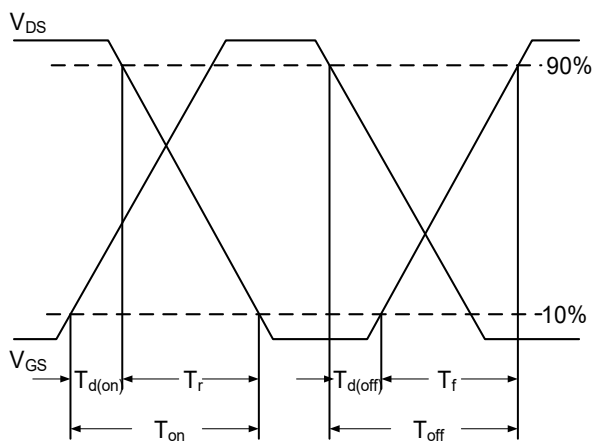


Fig.10 Switching Time Waveform

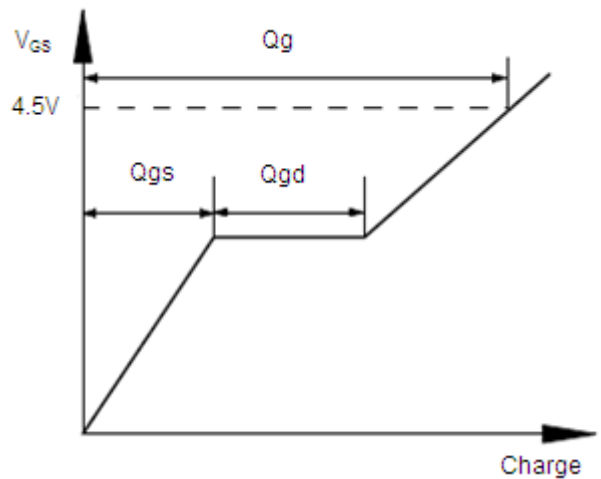
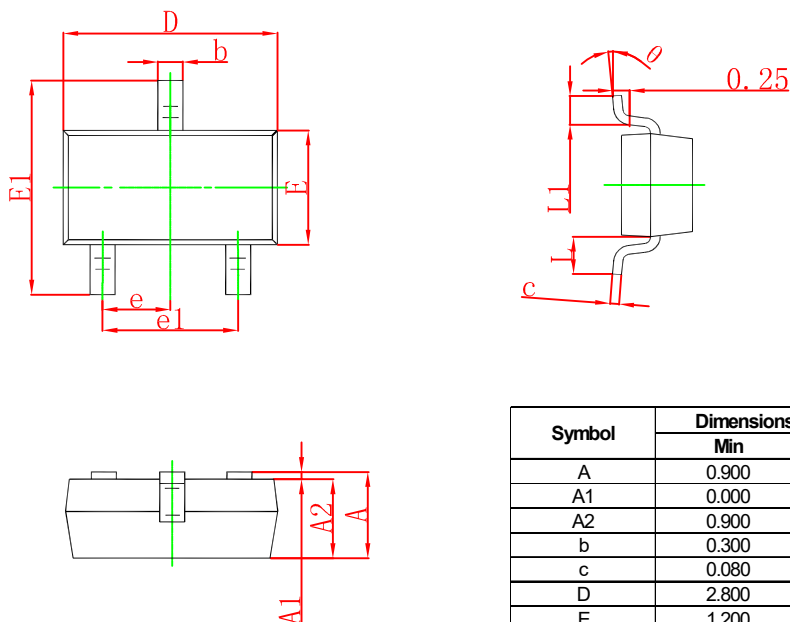


Fig.11 Gate Charge Waveform

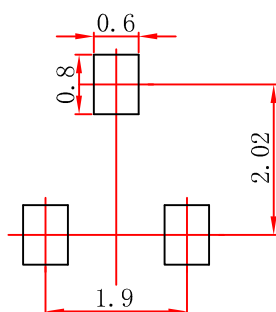


## SOT-23 Package Outline Dimensions



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.050 | 0.035                | 0.041 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                 |       | 0.022 REF            |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



Note:  
1. Controlling dimension: in millimeters.  
2. General tolerance:  $\pm 0.05\text{mm}$ .  
3. The pad layout is for reference purposes only.



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